Appendix G

Groundwater Quality Impacts

The purpose of this appendix is to describe the analysis used to calculate concentrations of key contaminants that could potentially reach the groundwater from the Low Level Burial Ground (LLBG) areas defined in each of the Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement (HSW EIS) alternative groups. The analysis also assesses the impacts to accessible surface water resources from contaminated groundwater. Calculated concentrations of key contaminants are compared to drinking water standards as a benchmark against which water aulity may be assessed. These calculations also provide the basis for estimates of potential human health risk and ecological risk for comparison among the alternative groups. Human health and risk consequences are discussed in Section 5.11.

Wastes considered in this assessment include previously disposed of wastes and wastes to be disposed of in the Hanford solid waste (HSW) disposal facilities (for purposes of analysis, year 2007 was assumed to be the date when new disposal facilities would be operational):

- Previously disposed of low-level waste (LLW), which includes:
  - LLW disposed of in LLBGs between 1962 and 1970 (referred to as pre-1970 LLW in this section)
  - LLW disposed of in LLBGs after 1970, but before October 1987 (referred to as 1970-1987 LLW in this section)
  - LLW disposed of in LLBGs after October 1987, but before 1995 (referred to as 1988-1995 LLW in this section)
- Category (Cat) 1 LLW, which includes:
  - Cat 1 LLW disposed of in the LLBGs after 1995 including Cat 1 LLW forecasted to be disposed of through 2007 (referred to as Cat 1 LLW [1996-2007] in this section)
  - Cat 1 LLW disposed of after 2007 including Cat 1 LLW forecasted to be disposed of through 2046 (referred to as Cat 1 LLW disposed of after 2007 in this section). For purposes of analysis, year 2007 was assumed to be the date when new disposal facilities would be operational

- Cat 3 LLW, which includes:
  - Cat 3 and greater than Cat 3 (GTC3) LLW disposed of in the LLBGs after 1995 including Cat 3 LLW forecasted to be disposed of through 2007 (referred to as Cat 3 LLW [1996-2007] in this section)
  - Cat 3 and GTC3 LLW disposed of after 2007 including Cat 3 LLW forecasted to be disposed of through 2046 (referred to as Cat 3 LLW disposed of after 2007 in this section).
- Mixed low-level waste (MLLW), which includes:
  - MLLW disposed of after 1996 including MLLW forecasted to be disposed of through 2007 (referred to as MLLW [1996-2007] in this section)
  - MLLW disposed of after 2007 including MLLW forecasted to be disposed of through 2046 (referred to as MLLW disposed of after 2007 in this section).
- Melters from the tank waste treatment program
- Immobilized low-activity waste (ILAW) from the tank waste treatment program.

Inventories of retrievably stored transuranic (TRU) waste in trenches and caissons located in the LLBGs were not evaluated for their groundwater impacts because the TRU waste will be retrieved and sent to the Waste Isolation Pilot Plant for disposal.

The groundwater exposure pathway analyzed considers the long-term release of contaminants from the variety of LLW and MLLW, analyzed groundwater transport through the vadose zone underlying the potential sources, and lateral transport through the unconfined aquifer immediately underlying the vadose zone to the Columbia River. The LLBGs are all located in the 200 Areas and the physical area of potential groundwater impacts is the unconfined aquifer bounded laterally by the Rattlesnake Hills in the west and southwest, by the Columbia River in the north and east, and by the Yakima River to the south (see Section 4.5, Figure 4.16).

This groundwater assessment was performed using a combination of screening techniques and numerical modeling. The groundwater modeling results predict contaminant concentrations in the groundwater associated with selected alternatives from assumed site closure at 2046 up to 10,000 years after LLBG closure. Although not specifically required by current regulations for LLW management, this assessment examined water quality impacts for up to 10,000 years after the operational period. Current requirements for performance assessment of LLW disposal facilities, as prescribed in DOE Order 435.1, focus on impacts during the first 1000 years after disposal.

Contaminants released from disposal facilities and other sources (for example, tank wastes, canyon facilities, the U.S. Ecology commercial LLW facilities) are included in an assessment of combined impacts in Section 5.14.